

Total No. of Questions :4]

SEAT No. :

**P2625**

**[5023]-44**

[Total No. of Pages :3

**M.Sc. - II**

**ANALYTICAL CHEMISTRY**

**CH - 390: Electroanalytical and Current Analytical Methods in Industries  
(2008 Pattern) (Semester - III)**

*Time : 3 Hours]*

*[Max. Marks :80*

*Instructions to the candidates:*

- 1) Answers to the two sections should be written in separate answer books.*
- 2) All questions are compulsory and carry equal marks.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Use of logarithmic tables / calculator (non-programmable) is allowed.*

**SECTION -I**

**Q1)** Attempt any four of the following:

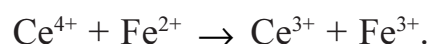
**[20]**

- a) Explain the construction and working of rotating platinum microelectrode.
- b) Describe the analytical applications of stripping voltametry.
- c) Define limiting current. Discuss the factors affecting on limiting current.
- d) A constant current of 0.853 A is passed through a copper chploride solution for 10 min. Calculate the weight of copper metal deposited on the cathode. [Given: At.wt. of Cu = 63.54]
- e) Determine half-wave potential of Ag/AgCl electrode having electrode potential - 2.240 volt at 27°C, the current generated by the rate of mass transport by diffusion is 2.82  $\mu\text{A}$ . [Given: cathodic diffusion current = 15.24  $\mu\text{A}$ ]

**P.T.O.**

**Q2)** Attempt any four of the following: **[20]**

- a) Describe the potential ramp used in square wave polarography. Distinguish between pulse polarography and square wave polarography.
- b) Write a critical note on chrono-amperometry.
- c) State the principle of amperometric titrations. Discuss the nature of amperometric titration curve when an electroactive reagent added into an electro inactive solution.
- d) What are nanomaterials? Give it's general applications.
- e) A 25 ml aqueous sample of Fe(II) was assayed in a 0.20 M ce (III) solution by controlled-potential coulometry. At the end point, area under the current-time curve was 20.0 mA min. Determine the concentration of Fe (II) in the sample. The overall electrode reaction was



### **SECTION -II**

**Q3)** Attempt any four of the following: **[20]**

- a) State and explain the principle of neutron activation analysis. Discuss the steps involved in neutron activation analysis.
- b) State and explain the principle of radiometric titration with suitable example.
- c) Discuss the principle and technique of direct isotope dilution analysis.
- d) Calculate the concentration of chloride in unknown solution having transmittance of 80.0% in the cell of path length 1.0 cm. The turbidity coefficient of the unknown sample is  $5.0 \times 10^{-3} \text{ lit mg}^{-1} \text{ cm}^{-1}$ .
- e) A 1 mg of labelled selenium having activity 8550 counts for 10 min, was mixed with 100 cm<sup>3</sup> of human blood serum. After through mixing 5 mg of selenium was extracted gave an activity 2500 counts for 5 min. Calculate the amount of selenium present in the human blood serum, if the background activity is 100 counts for 10 min.

**Q4)** Attempt any four of the following:

**[20]**

- a) State the principle of DTA. Discuss with neat labelled diagram, the working of differential thermal analysis.
- b) Explain, the characteristics of thermometric titrations. How it differs from conventional titrations?
- c) State and explain the principle of nephelometry with suitable schematic diagram.
- d) Discuss the applications of turbidimetry.
- e) An impure sample of calcium oxalate monohydrate was analysed using TGA technique. TG curve of the sample indicates total mass change from 90 mg to 45 mg, when sample was heated upto 900°C. Calculate the percentage purity of the sample.

[Given: At.wt. of Ca = 40, C = 12, O = 16 and H = 1].

*EEE*